

Name _____ Student Number _____

All solutions are to be presented on the paper in the space provided. The quiz is open book. You can discuss the problem with others and ask the TA questions.

(1) Evaluate the following limits:

(a) $\lim_{x \rightarrow 0.000001^-} \frac{|x|}{x}$

Since x is going to something bigger than 1, $\lim_{x \rightarrow 0.000001^-} \frac{|x|}{x} = 1$

(b) $\lim_{x \rightarrow 1^-} \frac{1}{x-1}$

$\lim_{x \rightarrow 1^-} \frac{1}{x-1}$ does not exist and is either ∞ or $-\infty$. Since $x-1 < 0$ when $x < 1$, the fraction $\frac{1}{x-1} < 0$, so the limit is $-\infty$.

Over \rightarrow

- (2) Give an example of a function that is left continuous at $x = 1$ but not right continuous. Hint: consider piecewise defined functions.

Anything of the following form works:

$$(1) \qquad f(x) = \begin{cases} x & ; x \leq 1 \\ x + 1 & ; x > 1 \end{cases}$$

- (3) Draw a picture of a function for which $f(1) = -2$ and $f(3) = 2$ but has no root in $[1, 3]$. Very briefly explain why the intermediate value theorem fails in this case.

The intermediate value theorem fails because the function is not continuous.